THE STERCULIACEAE IN THE FLORA OF THE SOUTHEASTERN UNITED STATES[1]

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ABSTRACT

The Sterculiaceae is represented in the southeastern flora by four genera and seven species which grow without cultivation. Distribution in the flora area is primarily in the warmer portions, mostly in the Coastal Plain Province. Taxa are highly polymorphic yet are well marked species in our range.

The Sterculiaceae in the southeastern flora is comprised of four genera and seven species which grow without cultivation. The family is primarily tropical and subtropical. Most commonly, those members in our range are restricted to the warmer portions, reaching their northern or near northern-most limits in our area. Most taxa are widely distributed in the Caribbean and in other parts of the neotropics. Some are introductions which are known sporadically in our area or as waifs in the northern limits of their range. Taxa are extremely polymorphic although our taxa are well-marked at the species level.

Descriptions and other data are based upon measurements and other observations on specimens collected within the southeastern states. Specimens studied are housed in the following herbaria: CITA, CM, CU, FLAS, FSU, GH, JSU (Jacksonville State University Herbarium, IAPT acronym, ined.), LSU, LTU, MARY, MO, NCU, NLU, NO, NY, SMU, TENN, TEX, UARK, UG, UNA, US, USF, VDB, VSC, and WVA. Documented county distribution in the area is depicted by accompanying maps.

SYSTEMATICS

Monoclinous or diclinous trees, shrubs, subshrubs and herbs; pubescence of stellate, forked, or simple unbranched hairs. Leaves simple, alternate, palmately veined, stipulate, and petiolate. Inflorescences determinate as thyrses or cymes, sometimes compact. Flowers monomorphic or dimorphic, perianth pentamerous, some apetalous; staminal tube present in most. Fruits primarily capsules with variable dehiscence but mostly schizocarpic. Many taxa closely

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[1] Prepared from data obtained during the preparation of the treatment of the Sterculiaceae for the "Vascular flora of the Southeastern United States." The systematics section is similar in format to that outlined in Radford et al. (1967). Comments regarding the improvement of this manuscript will be greatly appreciated. Commentary should be forwarded to the author prior to publication of the volume.

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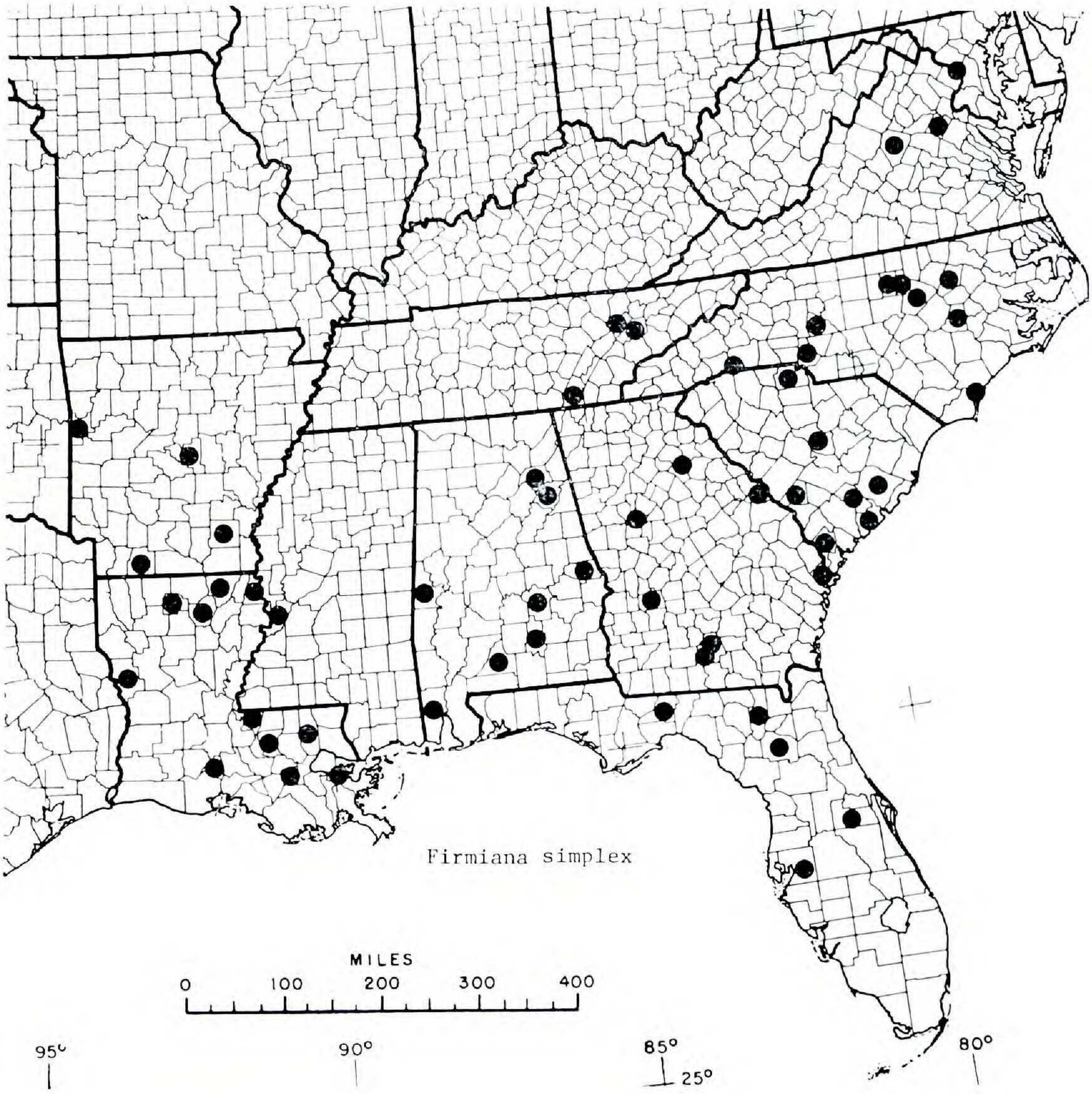
resemble and are frequently mistaken for members of Malvaceae. In our taxa, the stamen number is 5 (except *Firmiana*), whereas Malvaceae has stamens numerous.

About 60 genera and 700 species, distributed mostly in the tropics and subtropics (Willis 1973). Economically important members are *Cola* spp. and *Theobroma* (cacao). Buettneriaceae—S. Brizicky, G. K. 1966. The genera of Sterculiaceae in the southeastern United States. J. Arnold Arbor. 47: 60–74.

1. Trees; petals wanting; fruits follicles (phylloid) ..... 1. *Firmiana*
1. Shrubs, subshrubs, or herbs; petals present; fruits capsules or legumes
   2. Flowers solitary from leaf axils; petals with apical, abaxial appendage .. 2. *Ayenia*
   2. Flowers in cymose or capitate inflorescences; petals lacking apical, abaxial appendage
      3. Gynoecium unicarpellate; styles eccentric ..... 3. *Waltheria*
      3. Gynoecium 5-carpellate; styles epicentric ..... 4. *Melochia*

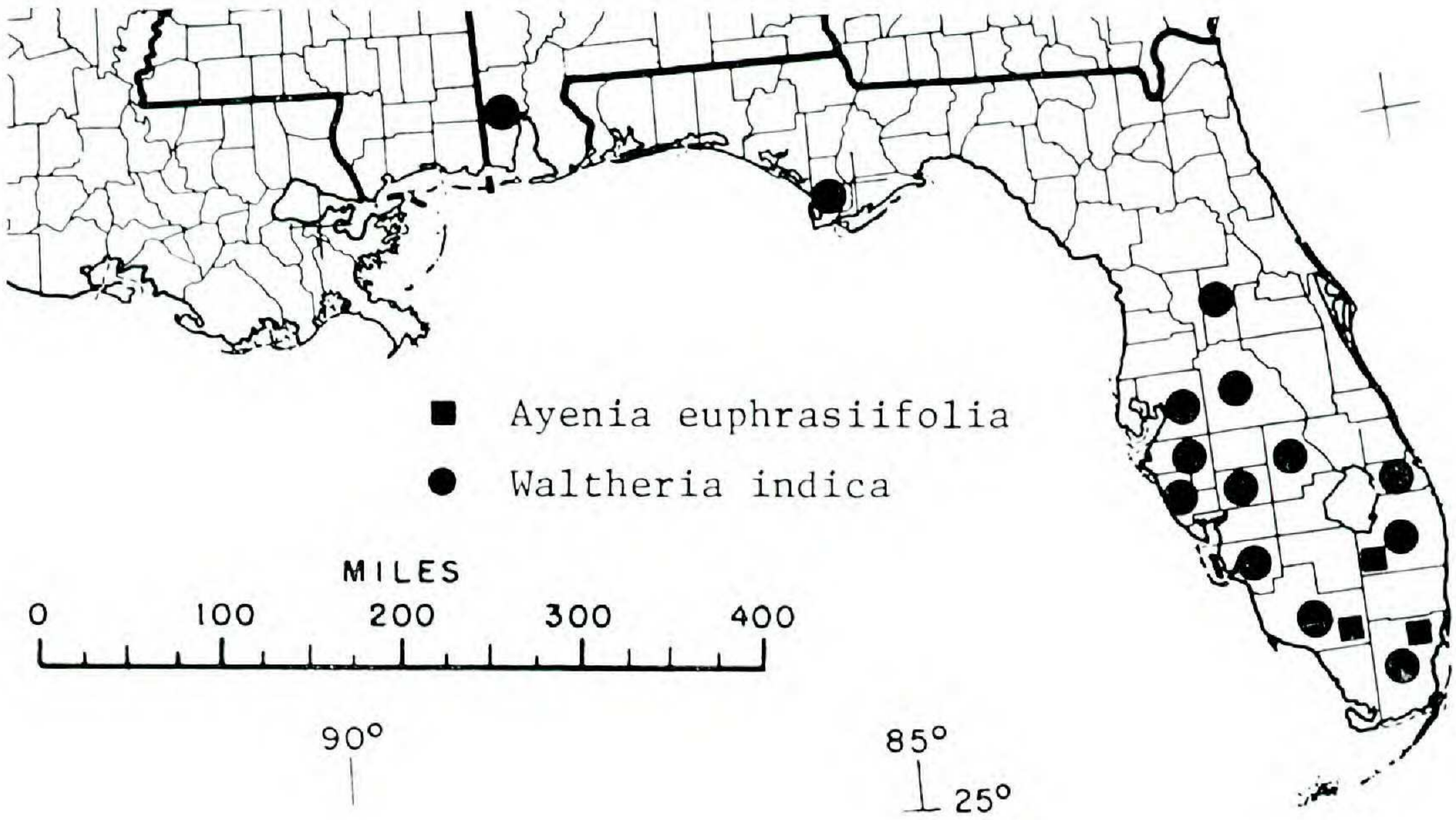
1. FIRMIANA Marsili

1. F. SIMPLEX (L.) Wight, Chinese Parasol Tree or Phoenix Tree—Small, monoecious trees. Twigs stout, green, buds with chocolate brown stellate pubescence. Leaves deciduous; blades palmately 3 to 5 (7) lobed, 8–40 cm, about as long as broad, minutely stellate pubescent above and below, glabrate above, apices along acuminate, margins cleft, lobes entire, bases cordate to rounded; petioles equaling or exceeding the blade; stipules caducous. Inflorescences axillary or terminal thyrses to 5 dm long; pedicels about 5 mm long, jointed above the middle. Flowers imperfect, actinomorphic, calyx tube cupuliform with a dense band of hairs and nectariferous disk surrounding the androgynophore, lobes to 10 mm long (greatly exceeding the tube), reflexed, somewhat darkened adaxially near the base; petals wanting; stamens (10) 15 forming a globular clump concealing the pistillodes, stamens in pistillate flowers sessile to subsessile on a subtending ring; gynoecium 5-carpellate, connivent below, styles connate. Follicles membranous, stipitate, 2–4 seeded, phylloid. Seeds orbicular, ca 6 mm broad, rugose; placentation marginal. (2n = 40) Summer. *F. platanifolia* (L.) R. Brown—S. *F. platanifolia* (L.f.) Marsili—R. Native to southeast Asia, probably China. Widely cultivated across the SE, often becoming locally established in the vicinity of planted trees. Often information is not present on herbarium specimens that indicate whether collections are from cultivation or from naturalized populations. Seedlings and transgressives have survived numerous winters in the Valley and Ridge Section of Alabama (personal observations). The maps include all localities from which vouchers were made. Juvenile leaves resemble those of *Aleurites fordii* Hemsley, yet lack the large glands at the junction of the petiole and blade. Kostermans, A.J.G.H. 1957. The genus *Firmiana* (Sterculiaceae). Reinwardtia 4: 281–310.



2. AYENIA L.

1. A. EUPHRASIIFOLIA Grisebach, Dwarf Ayenia—Perennial herbs and subshrubs. Taproots long, tough. Caudex broadly expanded with a whorled stubble of aerial stem bases; aerial stems prostrate, wiry, reddish-brown, 11–40 cm long, indumentum of stellate pubescence. Leaf blades orbicular to ovate, 0.4–1.4 cm long, surfaces reddish-brown mottled, venation palmate (evident below), pubescence stellate, apices cuspidate, margins dentate with bristle tips, bases (rounded) truncate to cordate; petioles 2–3 mm long; stipules subulate, caducous. Flowers solitary from axils of upper leaves, perfect, actinomorphic; calyx basally connate, lobes lanceolate to elliptic, about 1.8 mm long; petals reddish, rhombic, apically adnate to the staminal tube, ca 6 mm long, apices emarginate to cleft with an abaxial appendage,



bases long clawed; androgynophore 2.2–3 mm long, glabrous; stamen filaments connate for most of length; gynoecium 5-carpellate, less than 0.5 mm long, ovary ovoid, styles 1 with a capitate stigma slightly exerted from the androecium; pedicillate. Capsules septicidal and loculicidal, turgid, 4–5 mm broad, muricate with stellate bristles-tipped tubercles. Seeds 1 per locule, slightly conical, warty, brown with reddish glands. Year round. Pinelands, sandy scrub, rock flats, savannahs and waste places; CP: subtropical FL. *A. euphrasiaefolia* Grisebach, *A. pusilla* L.—S. *A. pusilla* was reported by Chapman (1884) and Small (1933), however, this species is South America in distribution. All specimens of "*A. pusilla*" at NY from Florida were annotated by Cristobal as *A. euphrasiifolia*. Cristobal, C. L. 1960. Revision del genero *Ayenia* (Sterculiaceae). Opera Lilloana 4: 1–230.

3. WALTHERIA L.

1. W. INDICA L.—Monoclinous, perennial, fruticose herbs or small shrubs; stems single or multi-stemmed to about 1.5 m. Taproot thick. Leaves deciduous, blades ovate, 1.5–6 (10) cm long, densely stellate pubescent, apices acute, margins dentate, bases cordate (truncate); petioles 1/4–1/3 the blade length; stipules subulate, caducous. Inflorescences capitate cymes, somewhat secund, terminal and/or axillary from upper leaves, subsessile or on peduncles to 3 cm long, outer bracts ovate, involucrate, inner bracts lanceolate. Flowers perfect, calyx flattened adaxially, slightly zygomorphic, to 3.7 mm long, tube strongly 10-nerved; lobes 1.5 mm long, apices long acuminate; corolla yellow, rotate, petals spatulate apically, clawed basally; staminal tube basally adnate to the corolla; ovary unicarpellate, stellate pubescent on the top half, styles eccentric, stigmas fimbriate; pedicels wanting. Legumes 1 (2)

seeded; seeds brown, 1.2 mm long. (2n=14) Year round. Hammocks, pinelands, and disturbed areas in sandy or rocky soils; CP: AL and FL [TX]. *W. americana* L.—S. Primarily distributed in south Fla, although reported along the northern Gulf Coast at Appalachicola, FL, and Mobile, AL, as apparent adventives.

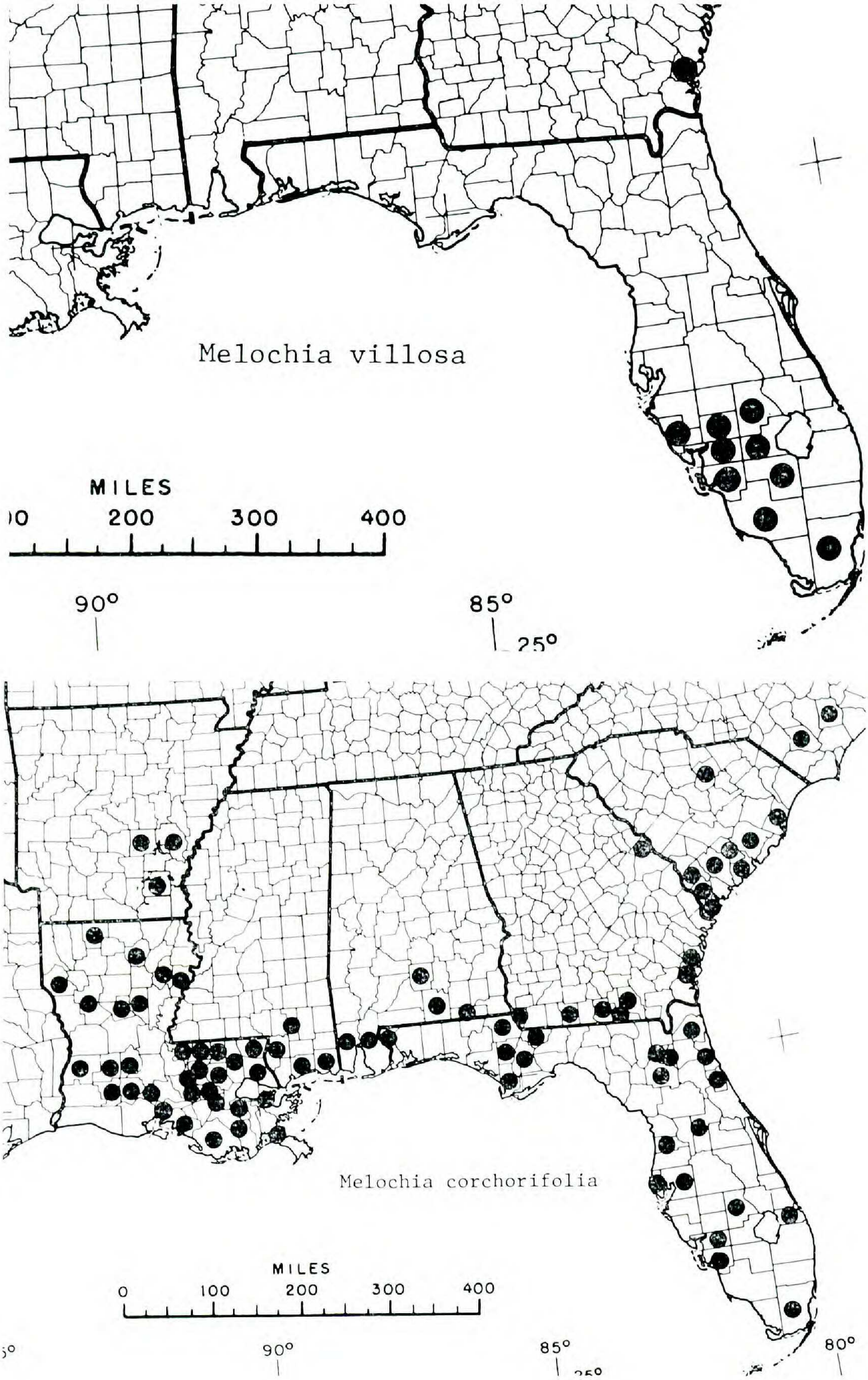
4. MELOCHIA L. Broom-wood

Annual or perennial herbs, shrubs, or subshrubs with stellate to unbranched pubescence. Taproots long, tough. Stems erect to sprawling. Leaf venation palmate, sometimes obscurely so; stipules caducous. Inflorescences cymose, terminal or axillary. Flowers perfect, actinomorphic, tetracyclic, pentamerous, dimorphic in some; stamen filaments basically connate. Fruits capsular. Goldberg, A. 1967. The genus *Melochia* L. (Sterculiaceae). Contr. U.S. Natl. Herb. 34: 191–363.

1. Involucel of 3+ bractlets; capsules subglobose.
   2. Inflorescences spicate; capsules less than 3.5 mm long ..... 1. *M. villosa*
   2. Inflorescences terminal on primary or lateral branches; capsules ca 5 mm long ..... 2. *M. corchorifolia*
1. Involucel wanting; capsules pyramidal.
   3. Leaves tomentose; capsules densely stellate pubescent ..... 3. *M. tomentosa*
   3. Leaves essentially glabrous; capsules sparsely pubescent, ciliate along the veins ..... 4. *M. pyramidata*

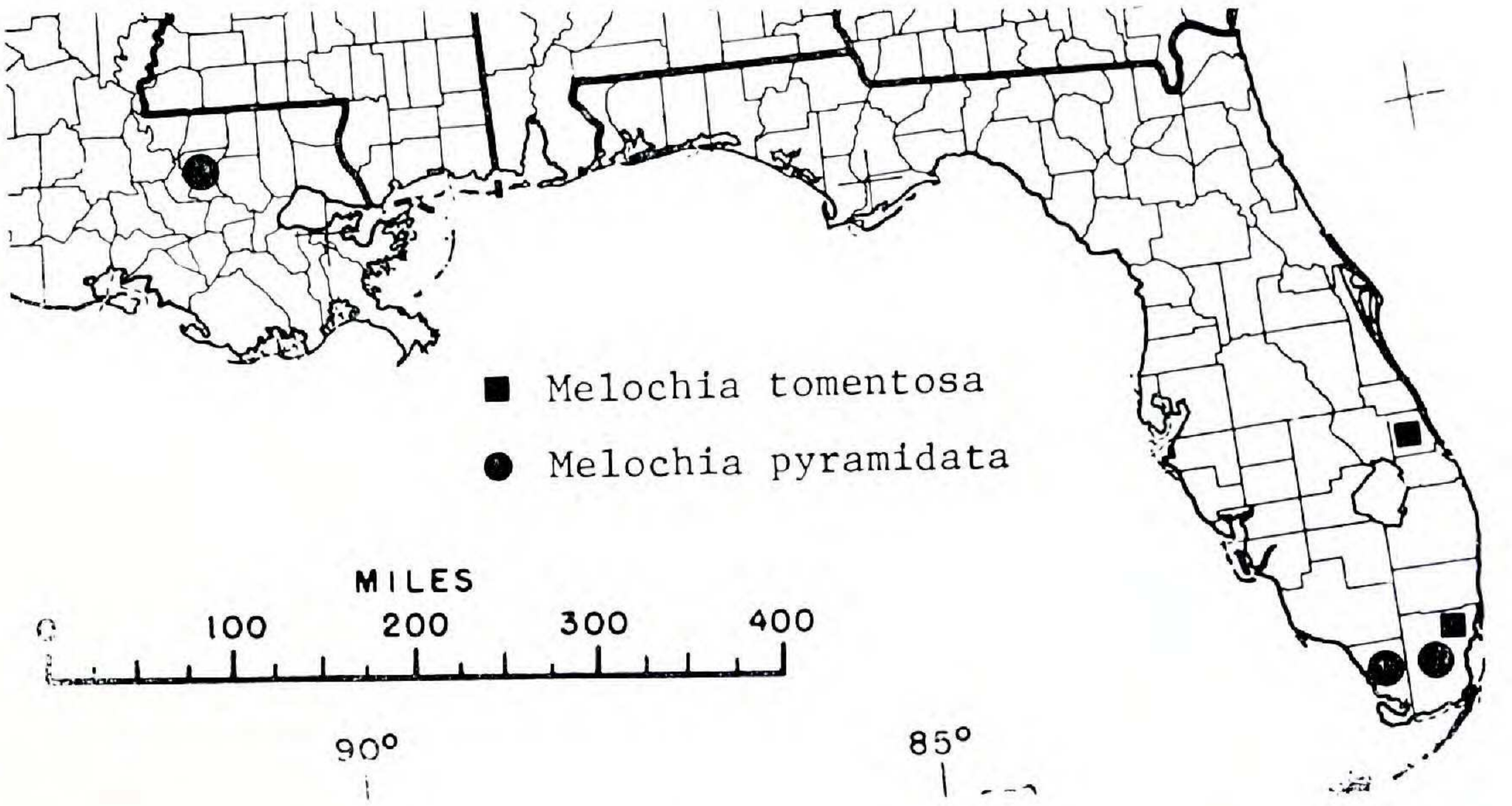
1. M. VILLOSA (Miller) Fawcett & Rendle. Suffrutescent herbs or subshrubs. Stems ascending, to 6 dm tall, brown, striate, sparsely spreading pubescent, densely pubescent in grooves. Leaves ovate, blades to 4 cm long, to 1.5 cm broad, appressed strigose, glabrate; apices short acuminate to acute, margins dentate, base rounded to truncate; petioles 1–7 mm long, hispid. Capitate cymes mostly spicate from axils of upper leaves (caducous so often absent at anthesis); subtended by an involucre of lanceolate bracts, strigose and sparsely stipitate glandular. Flowers dimorphic, calyx tube campanulate, lobes short acuminate, about 1.5 mm long, bearded on the adaxial tip; petals purple, blue, yellow or white, obovate, short clawed; gynoecium densely hairy, almost setose apically; styles united below. Capsules schizocarpic, spheroid, 3–3.2 mm long, stipes 1–1.5 mm long, lower portion spreading pubescent. Seeds 1 per locule, 2–2.5 mm long, mottled; placentation axile. Year round. Pinelands, flatwoods, roadsides, and waste places. CP: primarily s FL. (Glynn County, GA). *Riedlea hirsuta* Cav.—S. Widely distributed in the tropics and subtropics of the New World. Ours are var. *villosa*.

2. *M.* CORCHORIFOLIA L., Chocolate-weed—Annual herbs, stems single, erect or multiple-stemmed and ascending to divaricate, hollow on older growth, to 9 dm tall, with decurrent lines of stellate pubescence (especially evident above), otherwise sparsely stellate. Leaf blades green to almost completely red, (cordiform) ovate to lance-ovate, often with a shallow cleft near the terminus of primary lateral veins on larger leaves, to 10 cm long,



Melochia villosa

Melochia corchorifolia



4 cm broad, depressed reticulate above, venation obscurely palmate, sparsely hirsute along primary veins above and below, apices acute to short acuminate, margins serrate, bases cordate to truncate; petioles much shorter or exceeding the blade length, densely stellate and somewhat flattened along the adaxial surface; stipules subulate, to 4 mm long, bristle tipped. Inflorescences compact cymes terminal on primary or lateral stems, infrequently appearing racemose due to loss of leaves; bracts subulate with bristly margins forming a loose involucel; pedicels stout, ca 1 mm long. Flowers monomorphic; calyx of basally united sepals, lobes ovate, to 2.5 mm long, moderately strigose abaxially; petals pink, white, yellow or purple apically, yellow basally, spatulate, short clawed, stamen tube basally adnate to the petals; gynoecium ovate in outline, ca 1.5 mm long, densely strigose, styles short, stigmas free. Capsules initially loculicidal, becoming schizocarpic, broadly ovoid, shallowly depressed along the sutures, carpels ridged apically, ca 5 mm broad, moderately hirsute. Seeds somewhat trigonous with adaxial faces flattened to slightly concave, abaxial surface rounded, to 2.5 mm long; placentation basal. Late summer to fall, year round in peninsular FL. Fields, lawns, roadsides, waste places, infrequently aquatic; CP: AL, AR, FL, GA, LA, MS, NC, and SC [TX]. A pantropical and pansubtropical weed introduced in the New World. Extremely variable morphologically with numerous varieties named. Resembles *Malvastrum*, yet distinguished by the calyx length of 2.5 mm whereas *Malvastrum*'s calyx length is ca 5 mm long.

3. *M.* TOMENTOSA L., Wooly Pyramid Bush—Shrubs with stems to 2 m, densely covered with greenish, stellate pubescence on young twigs, older stems glabrate, brownish. Leaves deciduous, densely stellate pubescent; blades ovate, 1–5 cm long, 1–4 cm broad, apices acute, margins crenate to dentate, bases cordate to truncate; petioles 4–15 mm long. Cymes axillary or terminal on peduncles ca 1 cm long; bracts subulate. Flowers dimorphic; calyx tube

campanulate, lobes lanceolate, to 3.5 mm long, densely stellate pubescent; petals rose purple to blue, to 13.5 mm long; stamens exerted, filaments basally adnate to the petals; gynoecium pyriform, 4–14 mm long, styles connate below, free apically, stigmas papillose; pedicels 2–3 mm long. Capsules schizocarpic, pyramidal with winglike lobes, to 12 mm broad, densely pubescent. Seeds mottled, dark brown, 1.5–1.7 mm long, somewhat dolabriform. Year round. Rocky pinelands, xeric tropical hammocks; CP: s FL [s TX]. *Moluchia tomentosa* (L.) Britton—S. Rare in the flora area, known only from Dade and St. Lucie counties, FL. Widely distributed in the New World tropics and subtropics. Ours are var. *tomentosa*.

4. M. PYRAMIDATA L., Pyramid Bush—Slender annual or perennial herbs or subshrubs; stems to 2 m, erect or sprawling, pubescent along flattened side in new growth, glabrate. Leaf blades ovate to lanceolate, to 4 cm long, essentially glabrous above, scattered trichomes restricted to primary veins below, apices acute to short acuminate, margins dentate, bases rounded to remotely cordate; petioles to 1 cm long, pubescent adaxially; stipules subulate. Flowers solitary or in cymose, leaf-opposed inflorescences; peduncles 5–15 mm long, adaxially pubescent; bracteoles subulate; pedicels ca 1.5 mm long. Flowers dimorphic; calyx tubes campanulate, lobes 3 mm long, acuminate, margins and veins ciliate; petals lavender-blue, 6–7 mm long; staminal tube adnate to the petals, filaments free above the adnation; gynoecium ellipsoid in outline, 3.7–9 mm long, styles united for ca half their length. Capsules septicidal, sometimes apparently schizocarpic, pyramidal with winglike lobes, to 1.5 cm broad, ciliate along the veins, sparsely pubescent elsewhere. Seeds brownish, striate, to 1.7 mm long. Late summer to fall; year round in southern range. Roadsides, spoil banks, levees, disturbed areas; CP: FL and LA [TX]. Known from a few widely scattered localities in the flora area, i.e. Dade and Monroe counties, FL, and East Baton Rouge Parish, LA.

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